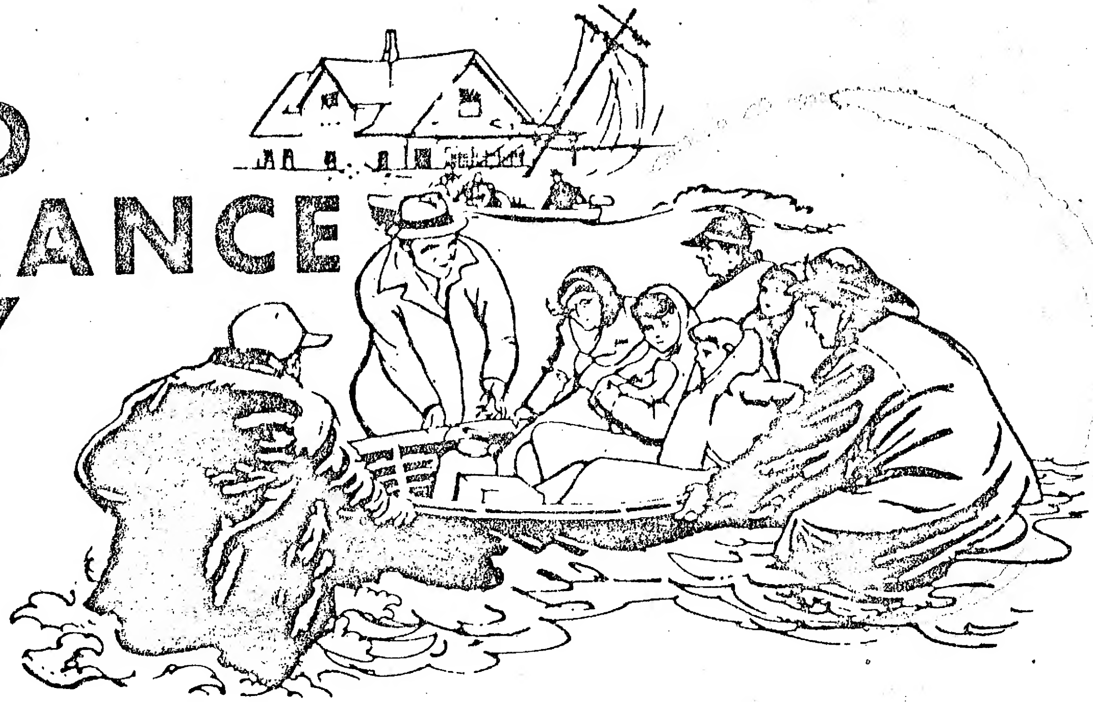
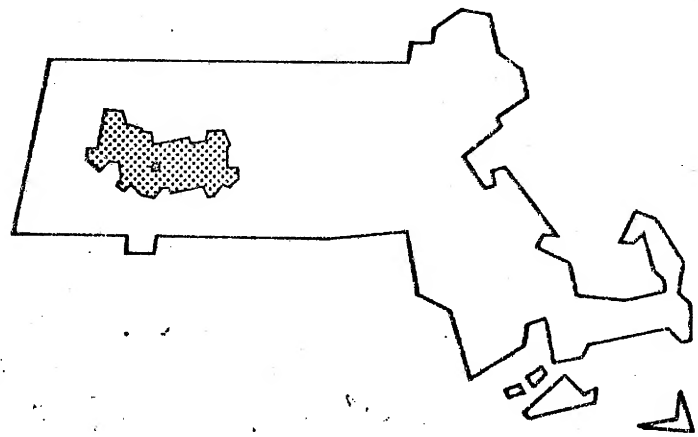
FLOOD INSURANCE STUDY



CITY OF NORTHAMPTON, MASSACHUSETTS
HAMPSHIRE COUNTY



U.S. DEPARTMENT of HOUSING & URBAN DEVELOPMENT
FEDERAL INSURANCE ADMINISTRATION

TABLE OF CONTENTS

TABLE OF CONTENTS - continued

FIGURES

TABLES

EXHIBITS

PUBLISHED SEPARATELY:

FLOOD INSURANCE STUDY

1.0 INTRODUCTION

1.1 Purpose of Study

The purpose of this Flood Insurance Study is to investigate the existence and severity of flood hazards in the City of Northampton, Hampshire County, Massachusetts, and to aid in the administration of the Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. Initial use of this information will be to convert the City of Northampton to the regular program of flood insurance by the Federal Insurance Administration. Further use of the information will be made by local and regional planners in their efforts to promote sound land use and flood plain development.

1.2 Coordination

The U.S. Geological Survey and the U.S. Soil Conservation Service were contacted in order to minimize possible conflicts or duplication of effort.

On March 10, 1975, a meeting was held with the city officials at the office of the U.S. Army Corps of Engineers' New England Division, for the purpose of discussing the status of the study. A brief discucsion was held on the Flood Hazard Boundary Maps.

The final coordination meeting was held on June 16, 1976, to review the results of this study. The meeting was attended by city officials, representatives of the Federal Insurance Administration and the U.S. Army Corps of Engineers, and the public. The study was accepted by the public.

1.3 Authority and Acknowledgments

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968, as amended.

The hydrologic and hydraulic analyses for this study were performed by the U.S. Army Corps of Engineers, New England Division, for the Federal Insurance Administration, under Inter-Agency Agreement No. IAA-H-2-73, Project Order No. 4 and IAA-H-16-75, Project Order No. 22. This work, which was completed in November 1976, covered all flooding sources affecting the City of Northampton.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the City of Northampton, Hampshire County, Massachusetts. The study area is shown on the Vicinity Map (Figure 1).

Floods caused by the overflow of the Connecticut and Mill Rivers were studied in detail. Detailed studies were not made for Basset Brook, Roberts Meadow Brook, Broad Brook, and other minor streams in the area. Due to the lack of current and planned development or to the surrounding topography, flooding on these streams was studied by approximate methods.

The areas studied in detail were chosen with consideration given to all forecasted development through 1981.

2.2 Community Description

The City of Northampton is primarily a residential and manufacturing city, located in west-central Massachusetts, approximately 90 miles from Boston and 150 miles from New York City (Reference 1). Bordering Northampton are the Towns of Easthampton, Westhampton, Williamsburg, and Hatfield. The city has a total land area of approximately 35 square miles, and a 1970 population of 29,700 or a population density of approximately 850 persons per square mile.

The terrain is hilly with elevations ranging from 200 feet National Geodetic Vertical Datum (NGVD) along the central section to 800 feet NGVD along the western part of the city. The area along the Connecticut River on the east is fairly level.

Temperatures in the region range from occasional highs slightly above 100°F to lows below -20°F. The annual snowfall, averaging 47 inches, occurs generally from November through April.

With the completion of the local flood protection project in 1941, the floodprone areas along the Connecticut River are, in general, located east of Interstate 91. Along the Mill River outside of the protected areas, the notable flood plain areas are located in the lower reaches of the river and in the area bordering North Maine and Spring Streets. Numerous city streets, state and interstate highways, and the Boston & Maine rail lines cross the existing flood plains. Continuing economic development within the study area is expected and pressure leading to intensified flood plain use will undoubtedly accompany such development. Some development along the low-lying areas of the tributaries can also be expected.

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT Federal Insurance Administration	APPROXIMATE SCALE
CITY OF NORTHAMPTON, MA (HAMPSHIRE CO.)	**VICINITY MAP**

1 0 1 2 3 MILES

FIGURE 1

2.3 Principal Flood Problems

Floods on the Connecticut River have resulted from excessive rainfall alone or in combination with snowmelt runoff (see Figures 2 and 3). Spring rains accompanied by melting snow in March 1936, resulted in the greatest flood known on the Connecticut River at Northampton. Another major flood, occurring in September 1938, resulted from a week of almost continuous rain culminating with heavy rains associated with an intense hurricane which passed up the basin. The U.S. Army Corps of Engineers has since constructed an upstream system of nine flood control reservoirs which will modify future floods in the area. Recurring March 1936 and September 1938, floods on the Connecticut River at Northampton, modified by the reservoir system, would have peak discharges of 187,000 and 148,000 cubic feet per second (cfs), respectively, compared to experienced flows of 244,000 and 189,000 cfs.

Three major floods have occurrred on the Mill River in recent years. The flood of September 1938, the maximum flood known on the Mill River in the Northampton area, was caused by rainfall associated with an intense hurricane. In August 1955, a peak discharge of 6300 cfs was recorded at the U.S. Geological Survey gaging station in Northampton. This is the maximum flow on record since establishment of the gage in October 1938.

2.4 Flood Protection Measures

The U.S. Army Corps of Engineers has completed protective works at Northampton which include an earth dike approximately 1 mile long, in the eastern part of the city, affording protection against high water from the Connecticut River, and an earth dike and concrete wall approximately 0.5 mile long in the western part of the city which affords protection against floods on the Mill River and backwater from the Connecticut River (See Figure 4).

U.S. Army Corps of Engineers' dikes are built to provide a minimum of 3.0 feet of freeboard, which is the vertical distance from the design water-surface to the top of the dike. Freeboard is provided to ensure that the degree of protection will not be reduced by unaccounted factors. These might include the effect of erratic hydrologic phenomena, future development in the watershed, embankment settlement, trash and debris, and variation of hydraulic resistance or other coefficients from those assumed in design. The design or effective height of a dike is, therefore, theoretically exceeded when the computed water level is within 3 feet of the top of dike. As shown on plates 01P through 04P, the computed 500-year frequency flood level on the Connecticut exceeds the design or effective height of the dike, somewhat, even though it is not actually exceeding the top of dike.

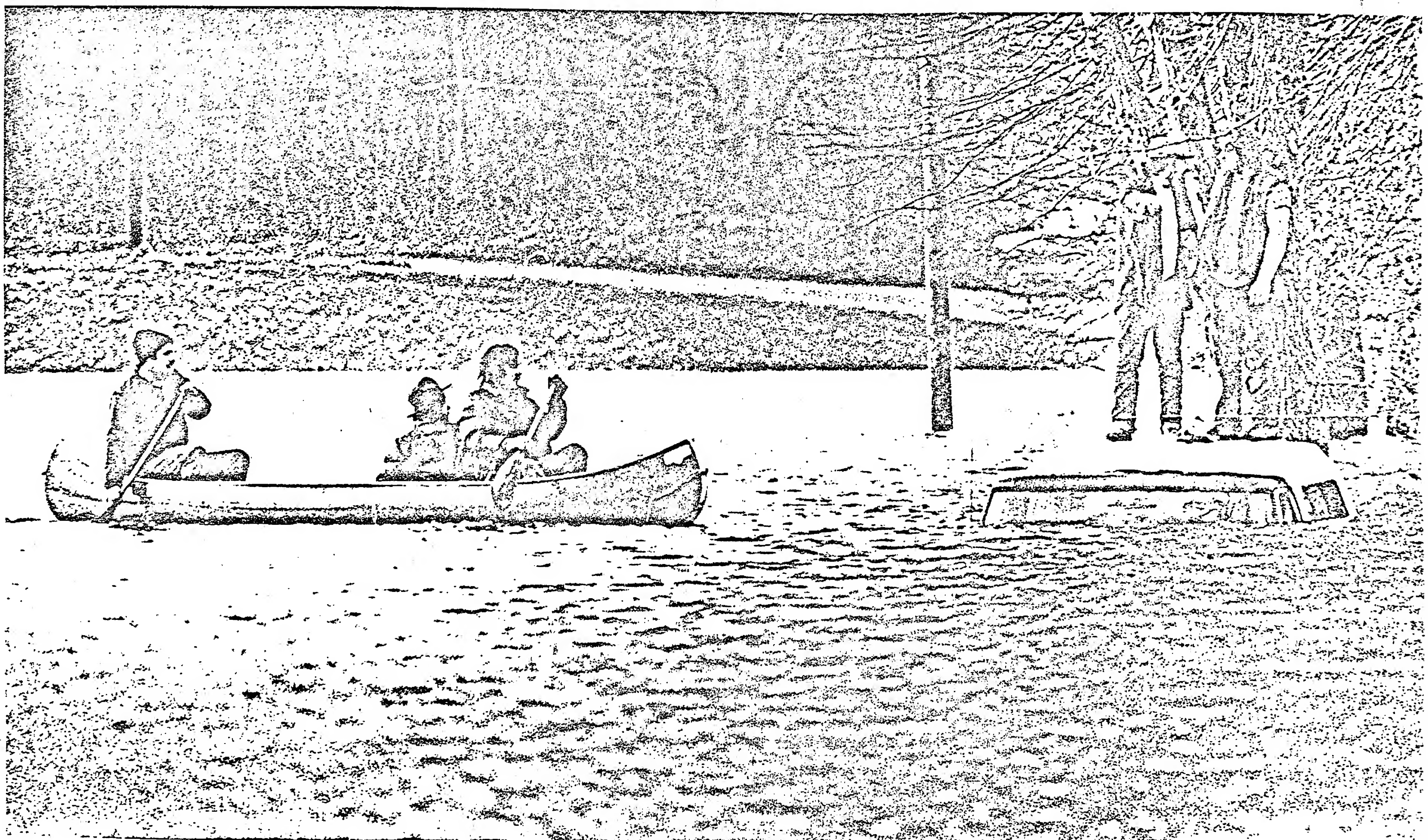


Figure 2. Flooding, April 1976, Oxbow, Northampton, Massachusetts (Courtesy of Springfield Daily News)

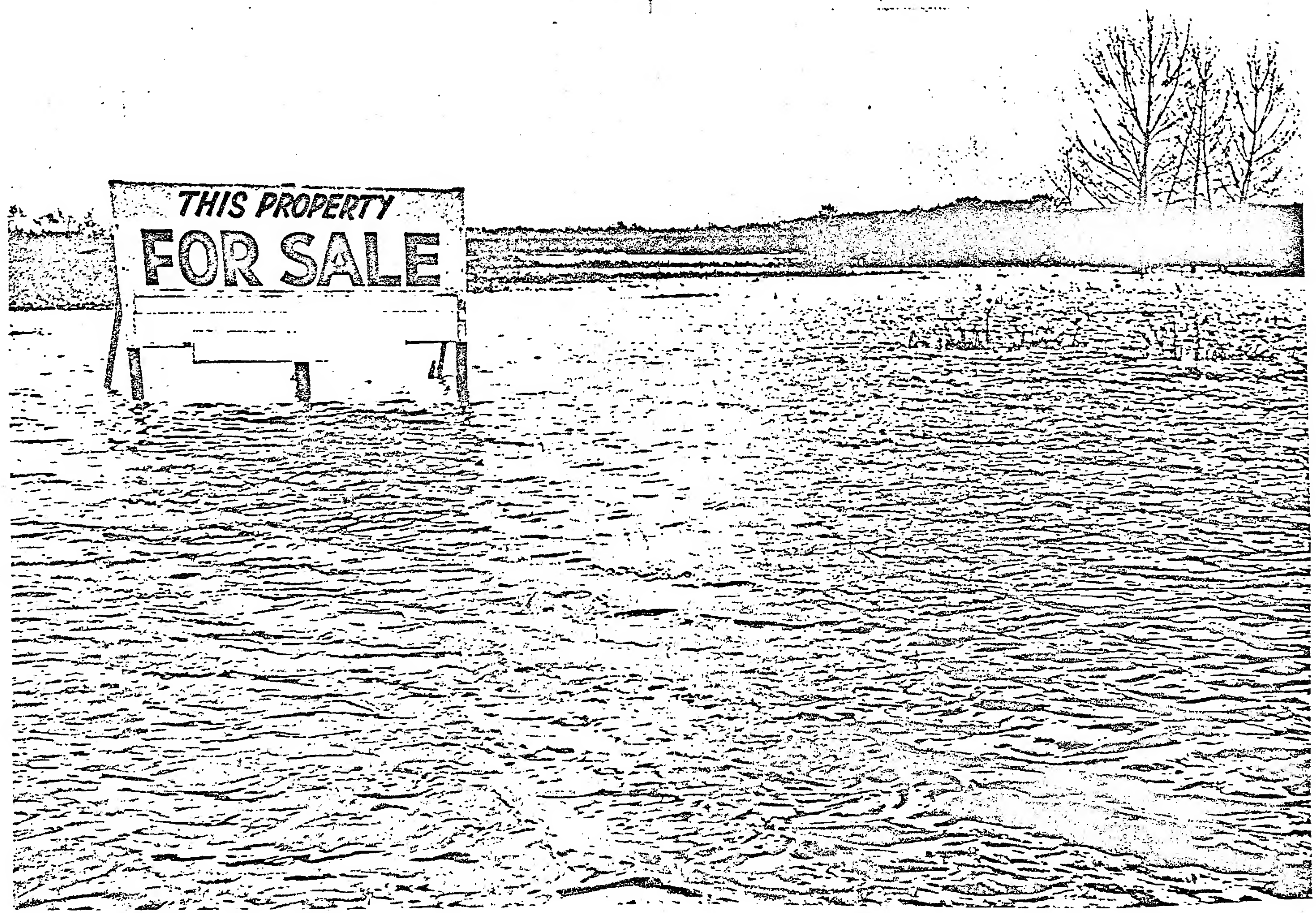


Figure 3. Flooding April 1976, Oxbow, Northampton, Massachusetts (Courtesy of Springfield Daily News)

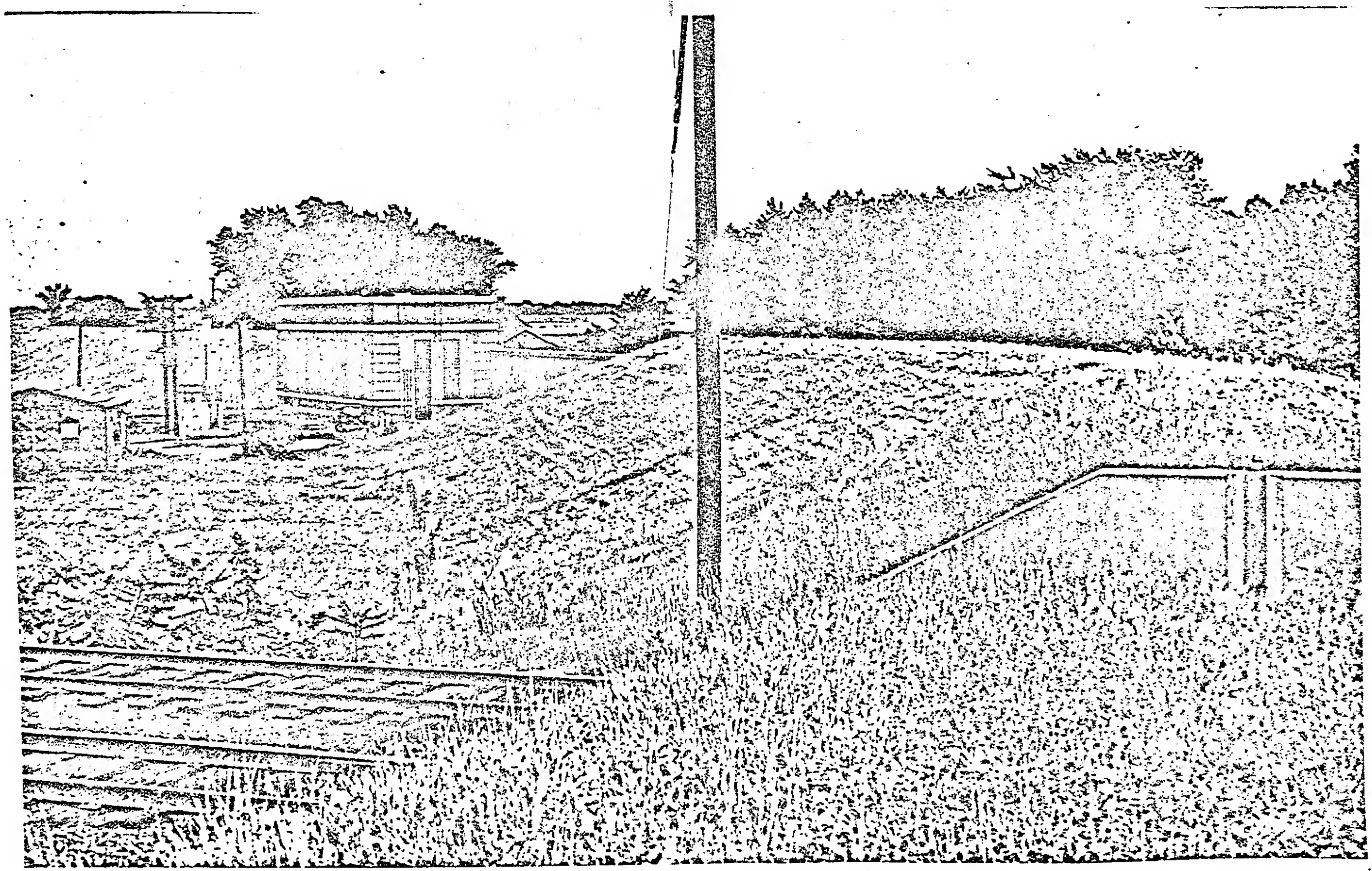


Figure 4. Northampton Dike and Pumping Station

The upstream flood control system constructed by the U.S. Army Corps of Engineers, consisting of nine reservoirs located on upstream tributaries of the Connecticut River, will have a modifying effect on future flooding in Northampton.

The original plan for flood control in the basin consisted of a system of dikes in combination with upstream reservoirs. The dikes and many of the reservoirs have been constructed. It is noted, though, that although the dikes at Northampton provide a high level of security, the degree of protection originally planned for is not provided.

3.0 ENGINEERING METHODS

For flooding sources studied in detail in the community, standard hydrologic and hydraulic methods were used to determine the flood hazard data required for this study. Floods having recurrence intervals of 10, 50, 100, and 500 years have been selected as having special significance for flood plain management and for flood insurance premium rates. The analyses reported here reflect current conditions in the watersheds of the streams.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for floods of the selected recurrence intervals for each stream studied in detail in the community.

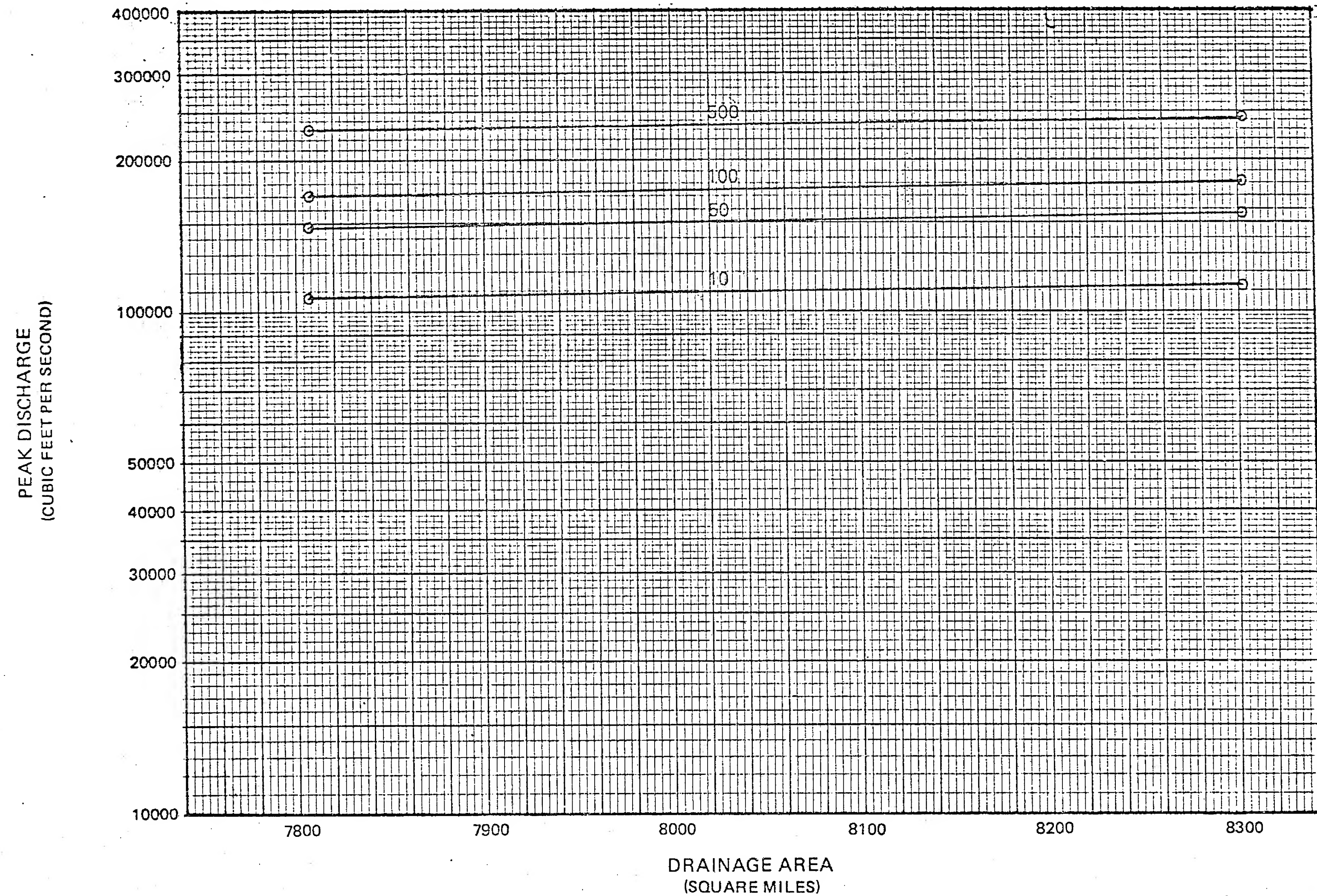
Annual peak discharge-frequency relationships for the Mill River were derived by statistical analysis of 35 years of discharge records from the U.S. Geological Survey gaging station on the Mill River at Northampton. Values of the 10-, 50-, 100-, and 500-year peak discharges were obtained from a log-Pearson Type III distribution of annual peak flow data (Reference 2).

Peak discharge-frequency values for the selected recurrence intervals for the Connecticut River were also developed using a log-Pearson Type III distribution of annual peak flow data and then adjusted to reflect the modifying effect of the system of upstream reservoirs. This modified frequency data was previously developed and published in a U.S. Army Corps of Engineers report (Reference 3).

Frequency-discharge, drainage area curves for the Connecticut and Mill Rivers are shown in Figures 5 and 6. The modifying effect of the U.S. Army Corps of Engineers' upstream flood control reservoir system is reflected in the discharges for the Connecticut River.

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of streams in the community were performed to provide estimates of the elevations of floods of the selected recurrence intervals along each stream studied in detail.



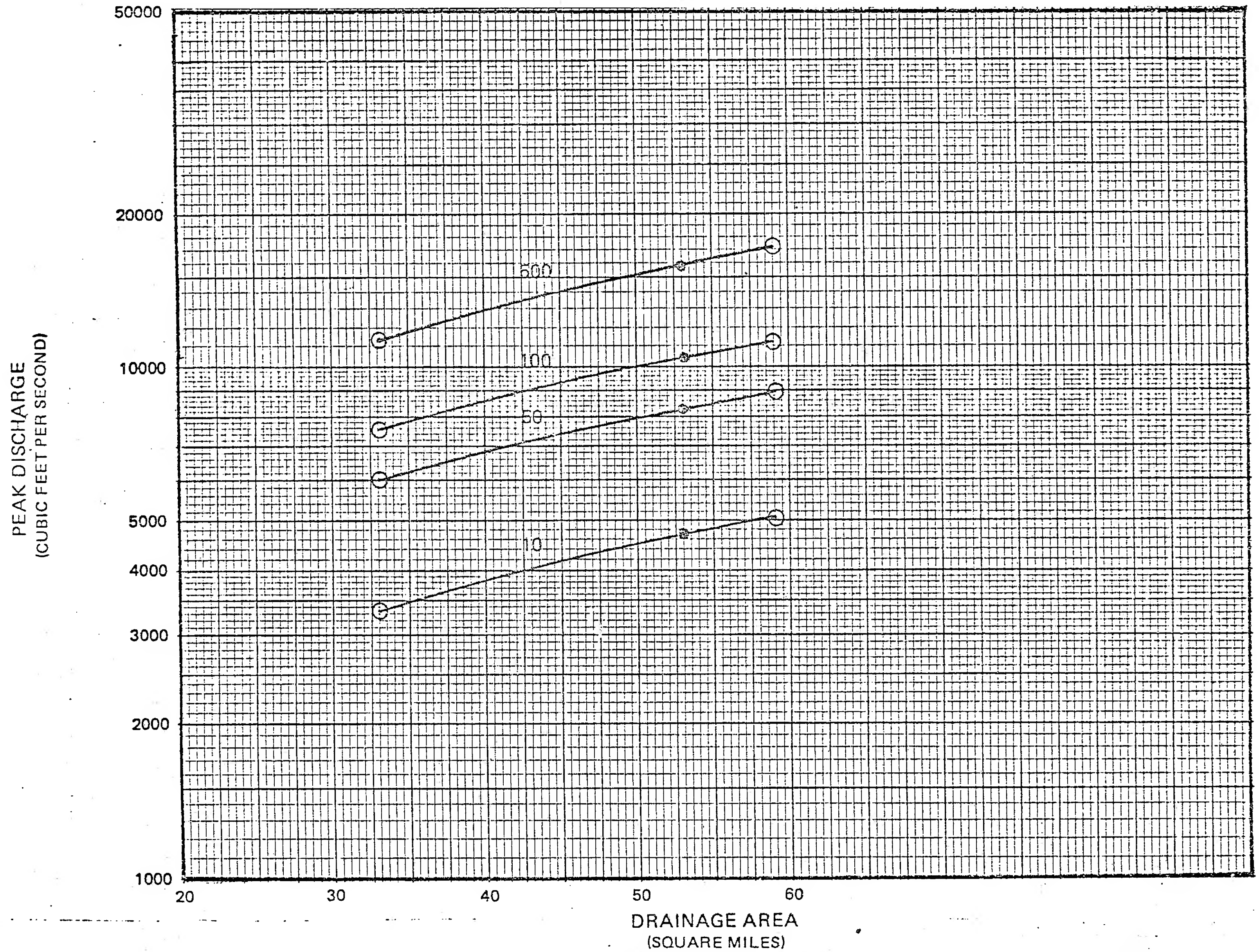
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CITY OF NORTHAMPTON, MA
(HAMPSHIRE CO.)

FREQUENCY-DISCHARGE, DRAINAGE AREA CURVES

CONNECTICUT RIVER

FIGURE 5



DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CITY OF NORTHAMPTON, MA
(HAMPSHIRE CO.)

FREQUENCY-DISCHARGE, DRAINAGE AREA CURVES

MILL RIVER

FIGURE 6

Water-surface elevations of the 100-year frequency flood on the Connecticut River and selected cross sections were taken from a previously published U.S. Army Corps of Engineers' study (Reference 4). The 100-year flood on a river is a flood having a magnitude that might be expected to be exceeded on an average of about once per 100 years, or would have an expected 1 percent chance of exceedance in any one year. Water-surface elevations for the 10-, 50-, and 500-year frequencies were determined by elevation-discharge relationships at selected locations within the study segment. Flood profiles were drawn between computed water-surface elevations to an accuracy of 0.5 foot for floods of the selected recurrence intervals (Exhibit 1).

For the Mill River, water-surface elevations of floods of the 10-, 50-, 100-, and 500-year recurrence intervals were computated through use of the U.S. Army Corps of Engineers step-backwater computer program (Reference 5). Cross sections for the backwater analyses for the Mill River were determined by field surveys and located, in general, at close intervals above and below bridges and dams in order to compute representative flood profiles. Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Boundary and Floodway Map.

All elevations are measured from National Geodetic Vertical Datum (NGVD); elevation reference marks used in the study are shown on the maps.

Channel roughness factors (Manning's "n") for these computations were assigned on the basis of field inspection of flood plain areas and on previous studies by the U.S. Army Corps of Engineers. Values of 0.07 were adopted for the overbanks and 0.035 for the channels. Energy losses due to changes in cross sectional areas of flow were computed using coefficients of 0.3 and 0.5 for contraction and expansion, respectively.

The step-backwater computations used to determine flood levels for the Mill River, in accordance with Federal Insurance Administration procedures, make no allowances for debris, excessive turbulence, or river bends which might effect flood levels experienced during a major flood. It is, therefore, concluded that the computed profiles represent minimum levels that might be expected under conditions of the various magnitudes of flow. The selection of "Manning's" coefficients for both the Mill and Connecticut Rivers was based largely on the calibration of the backwater model against experienced flood levels and known stage-discharge ratings.

Flooding on Basset Brook, Roberts Meadow Brook, Broad Brook, and other minor streams was approximated using information received from local sources, field inspection, and sound engineering judgement.

4.0 FLOOD PLAIN MANAGEMENT APPLICATION

A prime purpose of the National Flood Insurance Program is to encourage state and local governments to adopt sound flood plain management programs. Each Flood Insurance Study, therefore, includes a flood boundary map designed to assist communities in developing sound flood plain management measures.

4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by the Federal Insurance Administration as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community.

For both the Connecticut and Mill Rivers, the boundaries of the 100-year and the 500-year flood have been delineated using elevations determined at each cross section; between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:6000, with a countour interval of 5 feet (Reference 6). In cases where the 100- and 500-year flood boundaries are close together, only the 100-year flood boundary has been shown.

For streams studied by approximate methods, the boundary of the 100-year flood was delineated using the town topographic maps (Reference 6).

Small areas within the flood boundaries may lie above the flood elevations and, therefore, not be subject to flooding; owing to limitations of the map scale, such areas are not shown.

4.2 Floodways

Encroachment on flood plains, such as artificial fill, reduces the flood-carrying capacity and increases flood heights, thus increasing flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in the flood hazard. For purposes of the Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and floodway fringe. The floodway is the channel of a stream, plus any adjacent flood plain areas, that must be kept free of encroachment in order that the 100-year flood be carried without substantial increases in flood height. As minimum standards, the Federal Insurance Administration limits such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this report are presented to local agencies as minimum standards that can be adopted or used as a basis for additional studies.

The floodway for the Connecticut River was computed on the basis of a fixed top width as outlined in the HEC-2 Water-Surface Profiles users manual (Reference 7). The 100-year flood could, in general, be conveyed in a 3000-foot floodway without raising levels more than 1.0 foot.

The floodway for the Mill River was computed on the basis of a fixed top width with the left and right encroachment stations made equidistant from the centerline of the channel. Below the U.S. Army Corps of Engineers' local protection project drop structure, the width of the floodway varies from 500 to 800 feet and follows the existing Mill River course to the Oxbow and then continues along the southerly course of the Oxbow to the junction with the Connecticut River. Above the drop structure, the 100-year flood could, in general, be conveyed in a 150-foot floodway while adhering to the Federal Insurance Administration criteria.

Results of the floodway computations are tabulated at selected cross sections for the Connecticut and Mill Rivers in Table 1. As shown on the Flood Boundary and Floodway Map, the floodway boundaries were determined at cross sections; between cross sections the boundaries were interpolated. In cases where the floodway and 100-year flood boundaries coincide, only the floodway is shown.

Floodway data contained in the table includes information which treats the entire width of the Connecticut River; however, floodway delineation on the maps only shows the floodway on the Northampton side of the river.

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 7.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WITH FLOODWAY	WITHOUT FLOODWAY (FEET NGVD)	DIFFERENCE
CONNECTICUT RIVER							
A	93.10	3000[2]	67,400	2.9	122.8	122.8	0.0
B	94.50	3000[2]	59,400	3.4	123.6	123.3	0.3
C	97.10	3000[2]	57,400	3.5	125.4	124.6	0.8
MILL RIVER							
A	-1.10	800[2]	23,800	0.5	122.9	122.8	0.1
B	-0.30	800[2]	25,500	0.5	123.0	123.0	0.0
C	+0.70	500	11,500	1.0	123.0	123.0	0.0
D	1.40	500	8,300	1.4	123.0	123.0	0.0
E	1.57	150	1,810	6.3	127.5	126.5	1.0
F	2.12	145	1,580	7.2	130.4	130.0	0.4
G	2.16	155	1,560	7.3	131.2	130.9	0.3
H	2.22	135	1,650	6.9	133.1	133.1	0.0
I	2.42	150	1,730	6.6	134.3	133.9	0.4
J	3.25	350	3,420	4.0	149.5	148.5	1.0
K	4.42	140	780	13.6	175.6	174.8	0.8
L	4.66	130	1,300	8.5	191.3	190.9	0.4
M	4.68	130	1,170	10.0	191.4	190.9	0.5
N	5.72	120	950	11.5	216.0	215.0	1.0
O	5.90	125	740	14.3	225.7	225.7	0.0
P	5.98	150	1,300	7.9	239.5	239.1	0.4
Q	6.00	125	1,250	8.9	241.1	241.1	0.0
R	6.24	100	1,100	9.7	243.4	242.9	0.5

[1] Miles Above Mouth [2] Part of Floodway Extends Outside Corporate Limits

TABLE 1

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CITY OF NORTHAMPTON, MA
(HAMPSHIRE CO.)

FLOODWAY DATA

CONNECTICUT RIVER-MILL RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WITH FLOODWAY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	DIFFERENCE
MILL RIVER (continued)							
S	6.26	150	2,320	4.6	245.6	245.0	0.6
T	8.21	100	670	15.7	290.3	290.3	0.0
U	8.38	150	1,830	6.2	323.6	323.6	0.0
V	8.74	180	1,210	8.7	336.4	335.9	0.5

[1] Miles Above Mouth

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CITY OF NORTHAMPTON, MA
(HAMPSHIRE CO.)

FLOODWAY DATA

MILL RIVER

TABLE 1

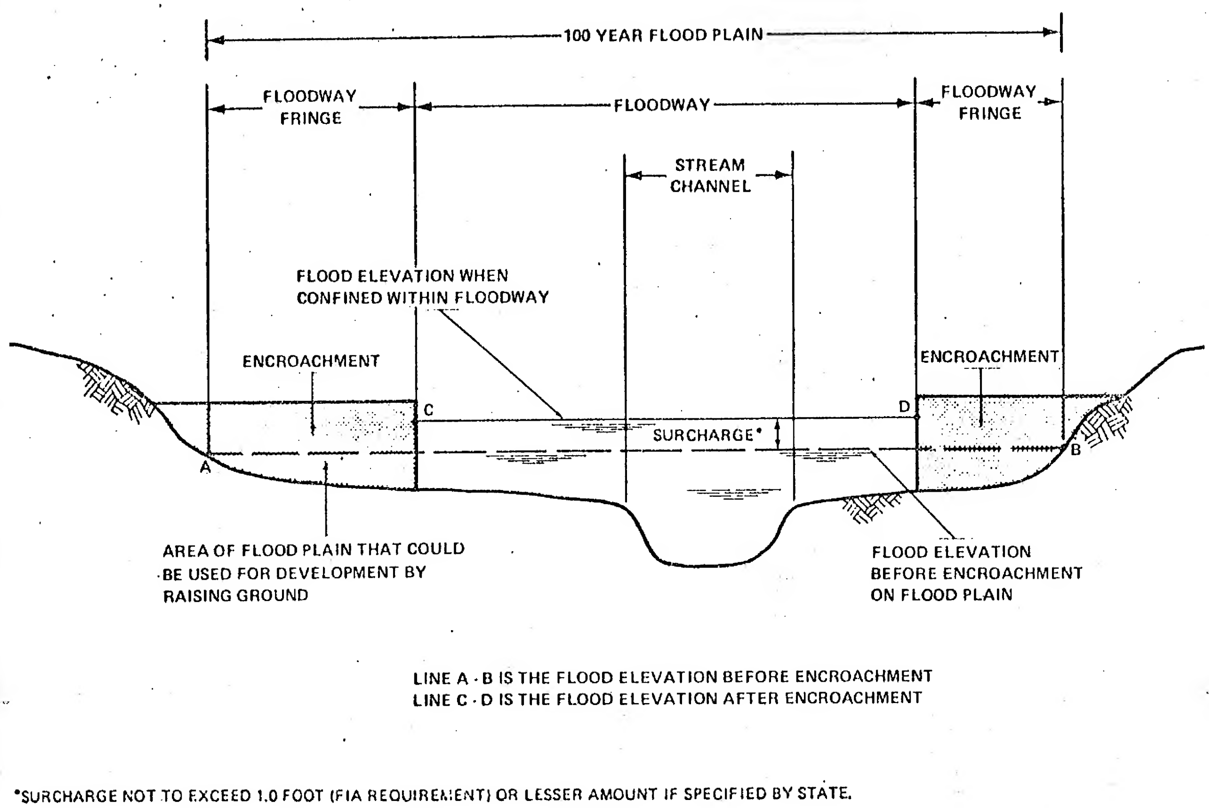


Figure 7. Floodway Schematic

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, the Federal Insurance Administration has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors, and flood insurance zone designations for each flooding source studied in detail affecting the City of Northampton.

5.1 Reach Determinations

Reaches are defined as lengths of watercourses having relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods. This difference does not have a variation greater than that indicated in the following table for more than 20 percent of the reach.

Average Difference Between 10- and 100-year Floods	Variation
2 to 7 feet	1.0 foot

The Connecticut River was considered to be one reach as the entire length was determined to have the same relative flood hazard.

The Mill River in Northampton has a significant fall of approximately 300 feet in its approximately 8 miles of length and is characterized by six dams located within this distance. Two reaches meeting the above criterion were required for the Mill River. Locations of the reaches for both the Connecticut and Mill Rivers are shown on the Flood Profiles (Exhibit 1).

5.2 Flood Hazard Factors

The Flood Hazard Factor (FHF) is the Federal Insurance Administration device used to correlate flood information with insurance rate tables. Correlations between property damage from floods and their FHF are used to set actuarial insurance premium rate tables based on FHFs from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations expressed to the nearest one-half foot, and shown as a three-digit code. For example, if the difference between water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year water-surface elevations is greater than 10.0 feet, accuracy for the FHF is to the nearest foot.

5.3 Flood Insurance Zones

After the determination of reaches and their respective Flood Hazard Factors, the entire incorpoated area of the City of Northampton was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations:

Zone A: Special flood hazard areas inundated by the 100-year flood, determined by approximate methods, no base flood elevations or Flood Hazard Factors determined.

Zones A7, A12, and A14: Special flood hazard areas inundated by the 100-year flood, determined by detailed methods; base flood elevations shown, and zones subdivided according to Flood Hazard Factors.

Zone B:	Areas between the special flood hazard area and the limits of the 500-year flood, including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; and areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot. Zone B is not subdivided.
Zone C:	Areas not subject to flooding by the 500-year flood, including areas that are protected from 500-year floods by dike, levee, or other water control structure; not subdivided.

Table 2, "Flood Insurance Zone Data," summarizes the flood elevation differences, Flood Hazard Factors, flood insurance zones, and base flood elevations for each flooding source studied in detail in the community.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the City of Northampton is, for insurance purposes, the principal result of the Flood Insurance Study. This map (published separately) contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by the Federal Insurance Administration.

6.0 OTHER STUDIES

An alternative flood management plan developed by the Soil Conservation Service is contained in a report entitled, "An Analysis of Alternative Flood Management Plans in Upstream Watersheds" (Reference 8). The report outlines nonstructural plans such as flood plain delineation, floodproofing, land use regulations, flood insurance, flood warning and evacuation plans as methods of providing substantial reduction in flood damages to existing properties in the Mill River watershed.

Incorporated into this study were data published previously by the U.S. Army Corps of Engineers in the reports entitled "Connecticut River Basin Program, Supplemental Flood Management Study" (Reference 3), and "Connecticut River Basin-Comprehensive Water and Related Land Resources Investigation" (Refernce 4).

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1% (100-YEAR) FLOOD AND			FLOOD HAZARD FACTOR	ZONE	BASE FLOOD ELEVATION[3] (FEET NGVD)
		10% (10-YEAR)	2% (50-YEAR)	0.2% (500-YEAR)			
CONNECTICUT RIVER							
Reach 1	02	+6.85	+2.18	+4.82	070	A14	Varies - See Map
MILL RIVER							
Reach 1	01	+5.80	+1.78	+4.13	060	A12	Varies - See Map
Reach 2	01,02	+3.63	+1.50	+2.16	035	A7	Varies - See Map

[1] Flood Insurance Rate Map Panel [2] Weighted Average [3] Rounded to Nearest Foot

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CITY OF NORTHAMPTON, MA
(HAMPSHIRE CO.)

FLOOD INSURANCE ZONE DATA

CONNECTICUT RIVER-MILL RIVER

TABLE 2

This study is authoritative for purposes of the Flood Insurance Program and the data presented here supersede all previous determinations.

7.0 LOCATION OF DATA

Survey, hydrologic, hydraulic, and other pertinent data used in this study are on file through 1981, at the Office of the U.S. Army Corps of Engineers, New England Division, 424 Trapelo Road, Waltham, Massachusetts 02154.

8.0 BIBLIOGRAPHY AND REFERENCES

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8. U.S. Department of Agriculture, Soil Conservation Service, An Analysis of Alternative Flood Management Plans in Upstream Watersheds, p. 69, June 1975

Map of Flood Prone Areas, Scale 1:24,000, Mt. Holyoke, Massachusetts, and Easthampton, Massachusetts, 1969

U.S. Army Corps of Engineers, Survey Sections Of Mill River, July 1974

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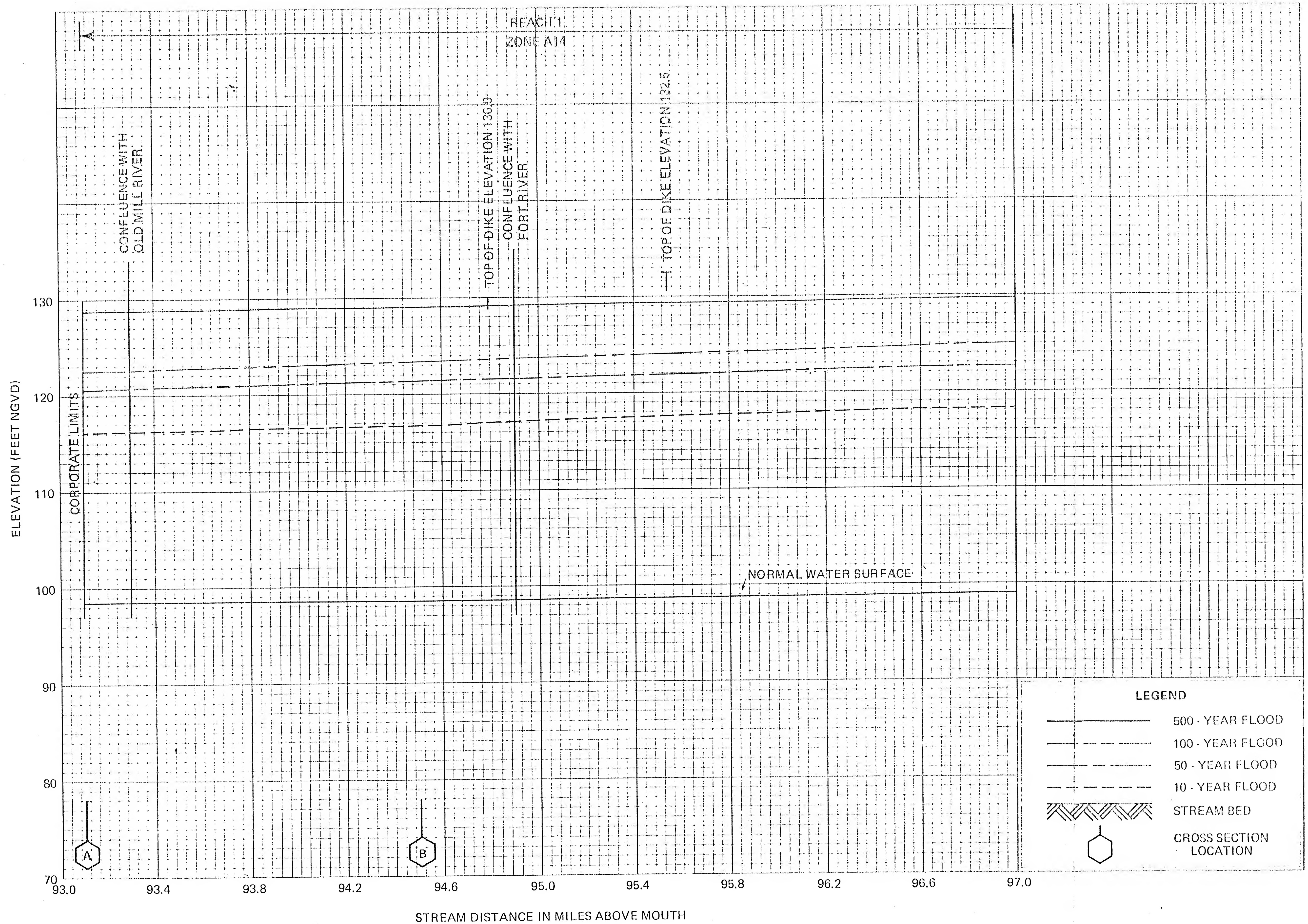
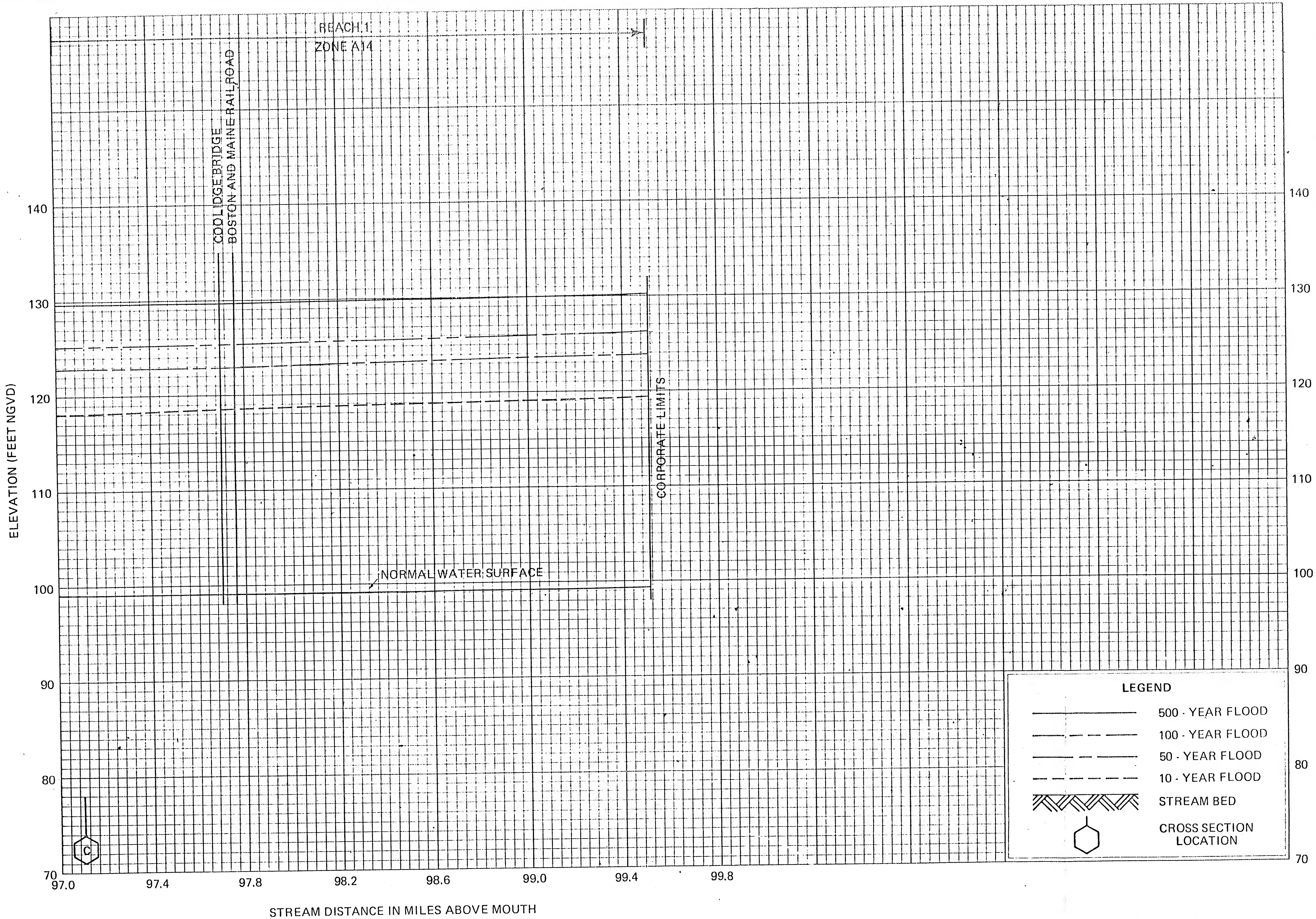
U.S. Geological Survey, _Topographic Map_, Scale 1:24,000, Contour Interval 5 feet: Mt. Holyoke, Massachusetts, 1964



FLOOD PROFILES
CONNECTICUT RIVER

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration
CITY OF NORTHAMPTON, MA
(HAMPSHIRE CO.)

01P



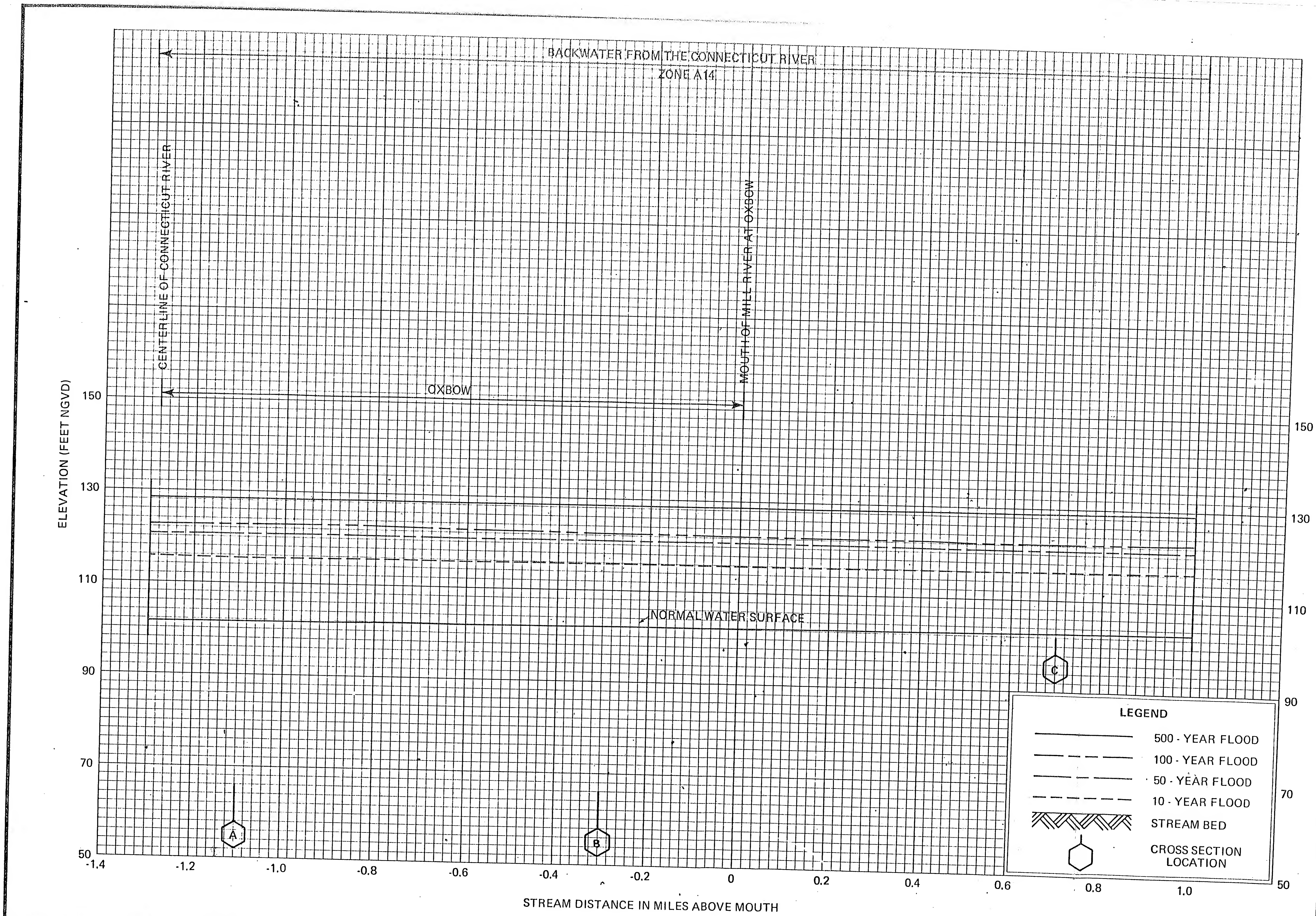
FLOOD PROFILES

CONNECTICUT RIVER

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CITY OF NORTHAMPTON, MA
(HAMPSHIRE CO.)

02P



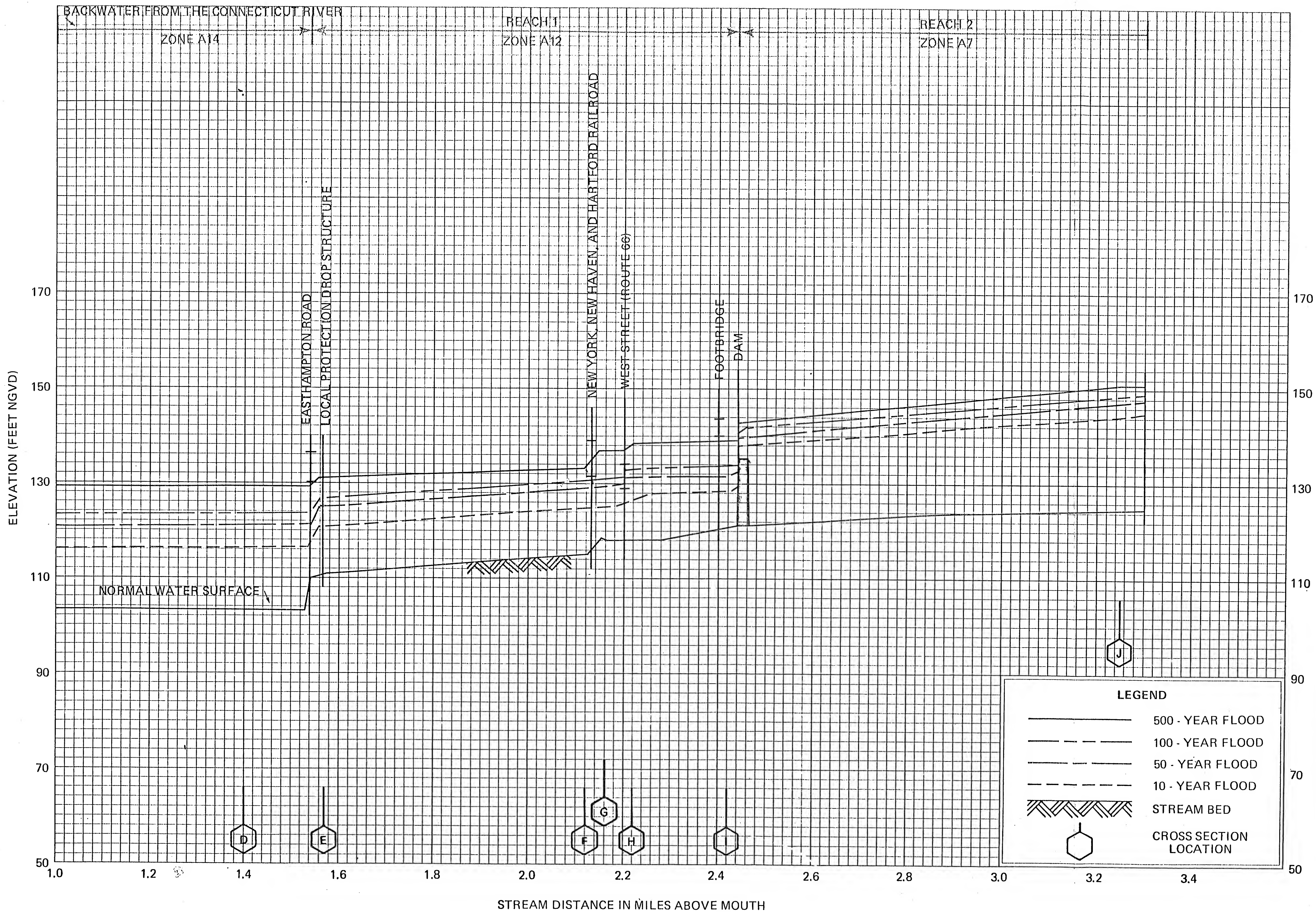
FLOOD PROFILES

MILL RIVER

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CITY OF NORTHAMPTON, MA
(HAMPSHIRE CO.)

03P



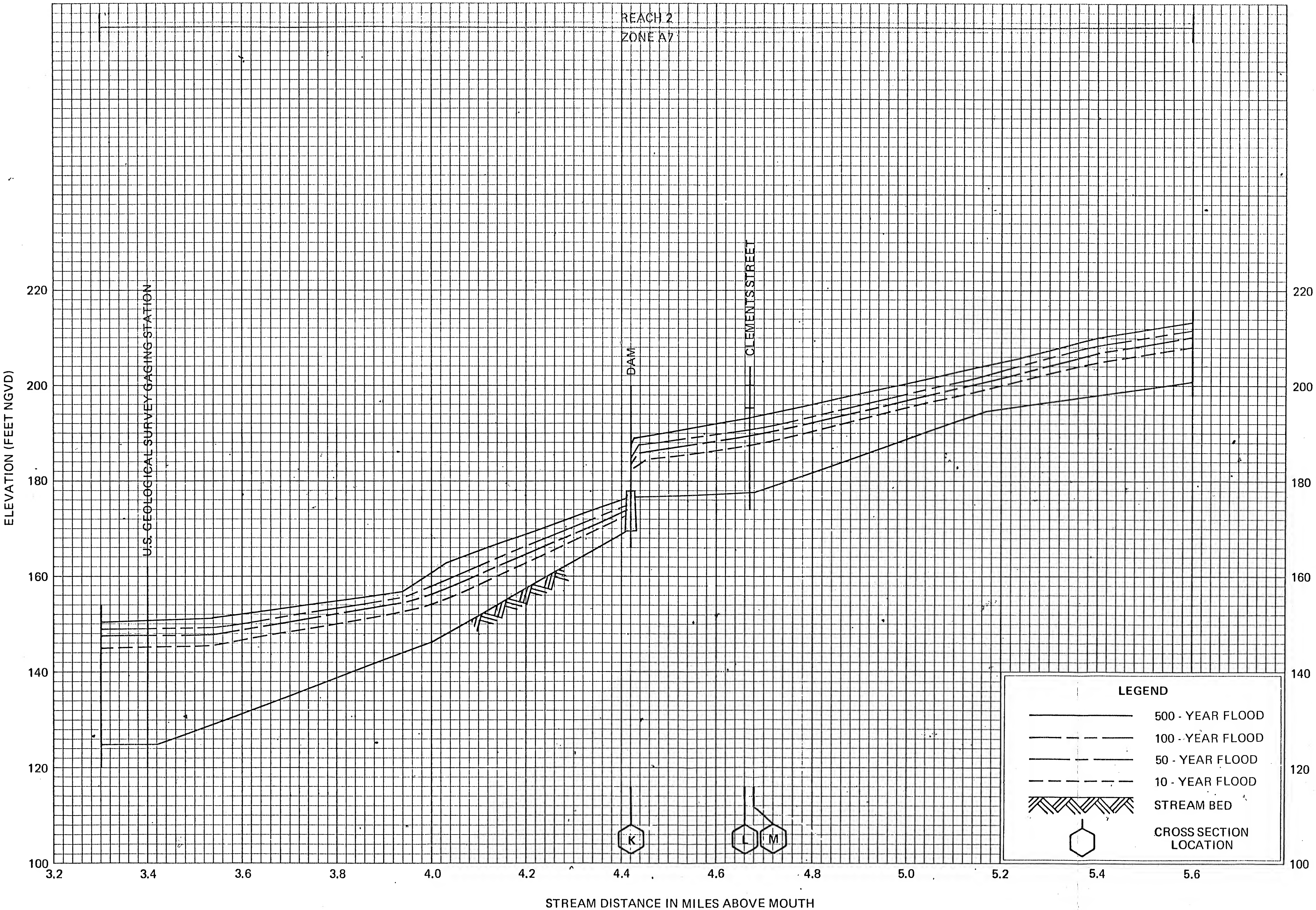
FLOOD PROFILES

MILL RIVER

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CITY OF NORTHAMPTON, MA
(HAMPSHIRE CO.)

04P



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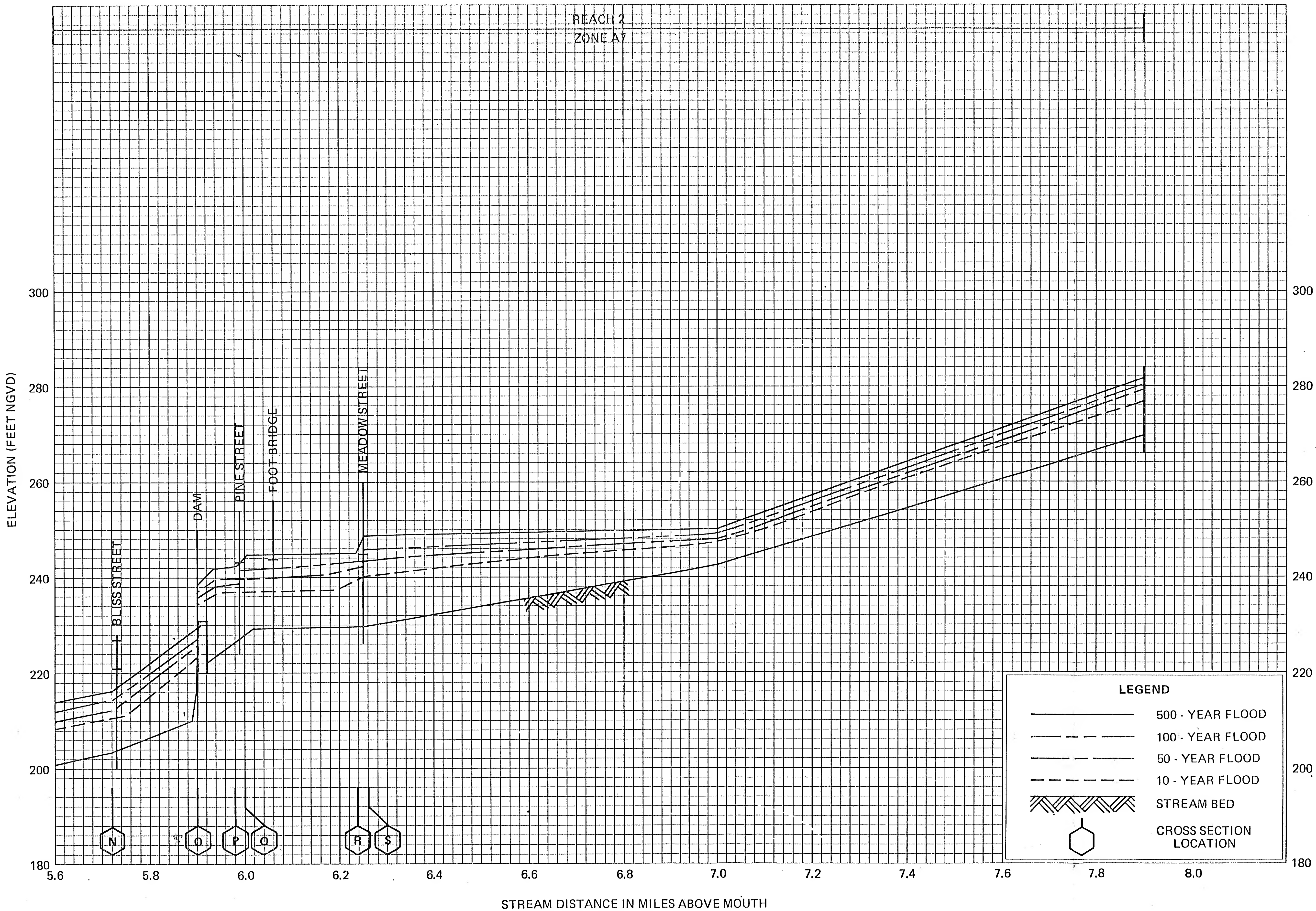
05P



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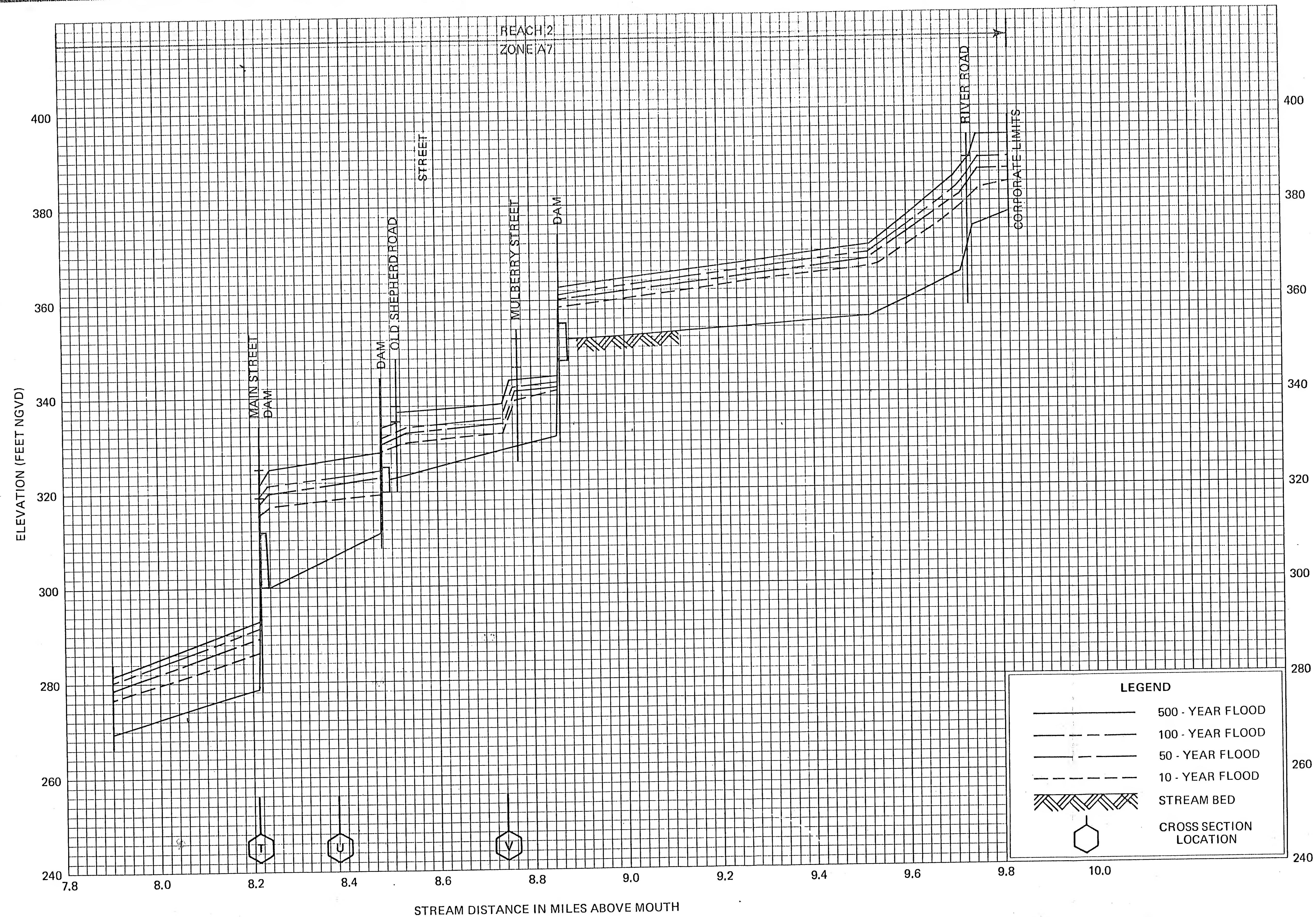
06P



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07P